



Cours de Physique Théorique de l'IPhT, année 2009-2010

Organisés en collaboration avec
Ecole Doctorale de Physique de la Région Parisienne - ED 107

Quantum many-body problem: selected topics

Olivier
Parcollet

Les vendredis 20/11, 27/11, 4/12, 11/12, 18/12/2009.

Institut de Physique Théorique

The goal of this set of lectures is to provide an introduction to some current themes of research in quantum many-body theory in condensed matter physics. The lectures will be primarily aimed at a non-specialist audience and I will try to emphasize the main results and open questions, while minimizing the technical derivations. The tentative plan is :

- 1) Introduction to strongly correlated systems.
 - From Fermi liquids to Mott insulators.
 - Examples of Mott insulators in solid state and atomic physics.
 - Doping a Mott insulator : the example of high-temperature superconductors.
- 2) Quantum impurity models in equilibrium.
 - Kondo and Anderson models. Kondo effect.
 - Methods of solutions of quantum impurity models.
 - Introduction to Dynamical Mean Field Theory and its applications.
- 3) Quantum impurity models out-of-equilibrium.
 - Schwinger-Keldysh formalism.
 - Illustration on simple examples.
 - Wingreen-Meir formula. Kondo effect in quantum dots.

Horaires : les vendredis de 10h00 à 12h15.

Lieu : IPhT, CEA Saclay, Orme des Merisiers, Bât. 774, p.1A Salle C. Itzykson.

Accès : Par lignes de bus publics (269.02 et 91.06) ou

- navettes CEA: RER B Le Guichet vers CEA Orme Bât. 774, toutes les 15 min de 8h00 à 9h45;
- navette CEA: CEA Orme Bât. 774 vers RER B Le Guichet à 12h36.

Renseignements : <http://ipht.cea.fr> ou ipht-lectures@cea.fr